

Title of abstract: The use of HiSPECT (micro-SPECT) in canine elbow disease

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**Introduction/Purpose:** Canine orthopedic problems in the forelimb frequently originate from the elbow. The origin of pain can be caused by developmental, traumatic or degenerative processes requiring different treatment strategies. Bone scintigraphy is included in the diagnostic frame work when clinical/radiographic examination is inconclusive or non-localizing. Determination of the exact localization of pathology within the elbow is hampered by resolution limits of conventional gamma camera systems. The use of conventional micro-SPECT systems is precluded by limited gantry opening.

The aim of the study was to investigate the value of HiSPECT (multi-pinholes mounted on a conventional gamma camera) in the evaluation of elbow pathology in the dog.

**Material and Methods:** 5 dogs with elbow disease were included (7 elbows). Radiographic examination was negative (N= 1), inconclusive (N=3) and not performed in 1 case. Two dogs had undergone arthroscopic interventions for an elbow problem, but lameness had switched to the other leg. All animals underwent planar bone scintigraphy. Micro-SPECT was performed using a conventional triple head gamma camera (Triad, Trionix), adapted with 3 multi-pinhole collimators (6 holes, 3 mm  $\square$ , resolution 2.5 mm) (Bioscan). Data were acquired in step-and-shoot mode (10 steps, 36° angular step, 120 sec per step). Images were reconstructed using a dedicated ordered subset-expectation maximisation (OSEM) algorithm (Scivis). Structural imaging and/or arthroscopy were performed to confirm pathology.

**Results:** The lame leg was correctly identified based on intensity of uptake on planar scintigraphy but no localization within the elbow could be determined. On the HiSPECT images, pathology could be confined to anatomical regions. Four elbows showed high uptake in focal regions. Pathology was confirmed with structural imaging or arthroscopy and included: avulsion of the flexor carpi ulnaris (N=1), loosening of the medial coronoid process (N=2) and a cystic lesion in the anconeal process (N=1). In one elbow, several areas of increased uptake were noted in the humerus and radius representing severe subchondral erosion on arthroscopy. In the previously operated elbows residual mild increased uptake in one elbow was focally at the level of a removed fragment of the coronoid process (scar tissue on arthroscopy) and more generalized in the other (erosion of the joint cartilage on arthroscopy).

**Discussion/Conclusion:** With the HiSPECT system increased uptake was discernible in localized elbow areas which correlated well with pathology found with structural imaging modalities and/or arthroscopy. HiSPECT improves anatomical localization of pathology and may allow a more accurate choice of subsequent structural imaging modalities and therapy.

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